Cultivating a Learning Analytics Culture at UTS
Boardroom, Staff Room, Server Room, Classroom

Simon Buckingham Shum
Professor of Learning Informatics
University of Technology Sydney
Director, Connected Intelligence Centre
https://cic.uts.edu.au • @sbuckshum

Keynote address: Centre for Education and Learning, Leiden-Delft-Erasmus Universities, 7th Dec. 2022
“LA culture” comes from trust

Trust comes from respectful conversations in 4 different ‘rooms’…
“Learning Analytics”
Beyond data dashboards

An LA dashboard ≠ agency
→ LA Literacy

Simply graphing data ≠ sensemaking
→ Data Storytelling

Time-consuming LA ≠ educator benefit
→ Automated Feedback
“Learning Analytics”
...a meaningless term to most academics

We now use language around differentiation, belonging and feedback

Automated Personalised Feedback
Automated Personalised Feedback – examples
Dispositional Learning Analytics: Personalised feedback with a Learning Power profile

Validated survey as part of an enquiry project

Cohort analytics: overview for subject coordinator

Distribution for each dimension across the cohort

A heads-up on how the cohort sees themselves…
Amplifying teacher presence via personalised feedback using OnTask

- Repository of student data (e.g. online activity; attendance; survey responses...)
- Message editor to differentiate feedback based on the student data
- Delivery system to preview and send email feedback

Activity-Based Conditional (ABC) Messaging: Tailored feedback at scale

(a) Feedback message to students who attended at least 1 class

"It's great that you've been able to attend at least one of our virtual classes over the last couple of weeks! I trust that you have enjoyed meeting your classmates, and learning together with your team. Please continue to keep up with the classes, and if you know anyone who has not been attending, do encourage them to join the weekly classes as well so that they don't miss out.

I do hope the rest of the week goes well for you, and see you at our next virtual class!

Kind regards,
Amee R, PhD
Subject Coordinator
School of Information, Systems & Modelling
Faculty of Engineering and Information Technology
University of Technology Sydney
Email: amee.rr@uts.edu.au

We look forward to you next class!

Brail Anre

(b) Feedback message to students who missed all classes weeks 1-3

"I noticed you haven't attended week 1, 2, and 3 classes. Your attendance at weekly classes is an important way to connect and learn with your class, as well as to ask any questions that you may have about the subject. I am concerned that if you continue to miss our classes, you may be missing out on opportunities to learn together with your class. For example, each week we have related in-class activities which students do in groups and is an opportunity to interact with your peers and polish soft skills such as communication, collaboration, active-listening, problem-solving, critical thinking, empathy, etc."
Writing Analytics:

24/7 personalised feedback on drafts

Genre: research abstract


Genre: reflective writing

It is now widely accepted that timely, actionable feedback is essential for effective learning. In response to this, data science is now impacting the education sector, with a growing number of commercial products and research prototypes providing "learning dashboards", aiming to provide real time progress indicators. From a human-centred computing perspective, the end-user's interpretation of these visualisations is a critical challenge to design for, with empirical evidence already showing that 'usable' visualisations are not necessarily effective from a learning perspective. Since an educator's interpretation of visualised data is essentially the construction of a narrative about student progress, we draw on the growing body of work on Data Storytelling (DS) as the inspiration for a set of enhancements that could be applied to data visualisations to improve their communicative power. We present a pilot study that explores the effectiveness of these DS elements based on educators' responses to paper prototypes.

Reflective Report

- Initial thoughts and feelings about a significant experience.
- The challenge of new surprising or unfamiliar ideas, problems or learning experiences.
- Deeper reflection, personally applied.
- How new knowledge can lead to a change
- Expressions indicating belief, learning or knowledge.
- Expressions indicating self critique.
- Words associated with strong feelings.
- Sentence too long, might disengage the reader. Try breaking it into smaller sentences.

Thus, this experience taught me that in future, I must take a patient-centred approach. I must spend time addressing the patients concerns and demonstrate excellent communication with them so they can fully understand their clinical picture and history. This relates to Domain 2: Communication and Collaboration, Standard 4: Apply Interpersonal Communication Skills to Address Problems, which is a standard in the National Competency Standards Framework for Pharmacists in Australia (2016). The incident has taught me to use a whole range of communication techniques when counselling a patient. It gave me the opportunity to practice this sort of behaviour in my subsequent weeks of clinical placement. It has strongly encouraged me to shift my perspective to one that focuses more on patient-centred care. I personally think that this is crucial in ensuring that a patient's health objectives are met. This standard I have obtained is important for any practising pharmacist.
Skills Analytics:
Tailored feedback on learning/career path choices

Upload your CV, and build your skills profile. Then…

Skills Analytics:
Tailored feedback on learning/career path choices

Boardroom
UTS strategic conversation started in 2011

- **2011**: Envisioning “the Data Intensive University”
  - DIU UTS-wide Forum

- **2012**: Connected Intelligence Strategy
  - Connected Intelligence Working Party
  - UTS-wide consultations and interviews

- **2013**: Privacy & Ethics Forum Plans for a Masters Degree
  - Director Appointed
  - Launch of the Centre
  - UTS-wide engagement
  - Collaboration Proposals Invited & Projects Initiated

- **2014**: Masters Degree Launches Analytics Pilots in Faculties
  - Recruit PhDs & Postdocs
  - First Pilot Evaluation Data

- **2015**: Growing number of Learning Analytics pilots
  - Initiate internal Data Science consulting
  - From pilots to mainstream release of LA tools

- **2016**:
CIC’s organisational positioning: hybrid research + service

CIC works closely with

- VC
  - DVC Research
    - Research Office
    - Faculty
      - School
        - Centre
          - Academics
  - DVC Education
  - DVC Student Support
  - Learning Tech & CPD
  - COO
    - IT
      - LMS
        - Analytics
  - Provost
    - CDO
      - BI
“Innovating for sustainable impact”

A comparison of the drivers behind the creation of 2 university analytics innovation centres, and the org structures that enable impact:

University of Technology Sydney
Connected Intelligence Centre

University of Michigan
Digital Innovation Greenhouse

EDUCAUSE Review
Aligning our LA with *UTS 2027* strategy

- **Lifetime of Learning**
- **Connected Research:** enhancing our pathways to impact
- **Our Distinctive Identity**
- **Sustainable Partnerships**
- **Working Together**

[https://strategy.uts.edu.au](https://strategy.uts.edu.au)
Aligning LA with “Learning.Futures” learning and teaching strategy

Focus on first year transition, belonging + employability and employment

Team project
Understand graduate attributes
Agency in learning
Setting goals
Design your UTS

Active Learning
Access clear explanations
Automated feedback
Academic feedback
Feedback
Industry feedback
Work Integrated Learning
Projects + Assessment

Feedback
Goals
Action
Plan revision
Revision

<table>
<thead>
<tr>
<th>Category</th>
<th>Count/Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL faculties</td>
<td>have piloted at least one CIC tool</td>
</tr>
<tr>
<td>4918 students</td>
<td>used a CIC analytics tool</td>
</tr>
<tr>
<td>133 industry</td>
<td>partners attended CIC events</td>
</tr>
<tr>
<td>147 staff</td>
<td>attended CIC events</td>
</tr>
<tr>
<td>3000 reads</td>
<td>of our <em>AI in Education</em> Conversation article in first week</td>
</tr>
<tr>
<td>150 msecs</td>
<td>to analyse a page of student writing</td>
</tr>
<tr>
<td>29 government</td>
<td>partners attended CIC events</td>
</tr>
<tr>
<td>30 papers</td>
<td>peer reviewed in archival journals and conferences 2015-17</td>
</tr>
<tr>
<td>231 staff</td>
<td>trained in/piloted a CIC analytics tool</td>
</tr>
</tbody>
</table>
“CIC hired a data scientist who works as an internal consultant with UTS teams from any part of the university, providing rapid analyses of their data. This has proven extremely valuable to UTS clients...”
Student language support team: Are we making a difference to student grades?

“Compared to a control group of students, students who attended a student support service improved their grades significantly, converging on the control group.

From 2013 – 2019 we closed this gap.”
Do students who spend a year abroad benefit, compared to those who stay in Sydney?

“CIC’s Data Scientist developed a statistical method to reliably compare students who spent a year overseas with comparable students who did not.

We have been able to use this evidence to speak concretely about our value at Open Days and as part of the retention strategy for the degree.

This was well received at the highest levels of the university and was greatly appreciated by our partner faculties, which were able to use the information specific to their students to amplify our message.”
"UTS is the world’s first university to provide students with instant formative feedback on reflective writing, with another version focusing on analytical, argumentative writing. Pilot studies with >1800 students provide evidence..."
“Pilots with almost 3000 students and 30 staff provide evidence that when students see their dispositions visualised, this can provoke valuable reflection on the qualities that build their resilient agency...”
Staff room
Walking in the shoes of academics

No trust, no LA deployments!
We are academics and educators ourselves, and know the pressures

We recognise the reputational risk educators are taking with any new EdTech
→ LA+LD support

Mutual learning and respect: it goes both ways
Done well, it’s exhilarating!
Co-designing writing analytics with academics

Writing the automated feedback messages

https://www.heta.io/co-designing-automated-feedback-on-reflective-writing-with-the-teacher
Google Doc to draft the feedback contingent on patterns:

- **presence/absence**
- **sequencing**
- **positioning**

of sentence types

<table>
<thead>
<tr>
<th>Highlighting Category</th>
<th>Positive feedback (Presence of highlighting)</th>
<th>Cautionary feedback (Absence of highlighting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;icon&gt; Context, clear of judgments</td>
<td>Well done, it appears that you’ve acknowledged your first thoughts, feelings and/or reactions to an incident, or learning task, within the first paragraph. AcaWriter couldn’t spot this.</td>
<td>Perhaps consider introducing your first thoughts, feelings and/or reactions to an incident, or learning task, within the first paragraph.</td>
</tr>
<tr>
<td>&lt;icon&gt; Challenge (strategies to overcome?)</td>
<td>Well done, it appears that you’ve reported on anything you found challenging. Do you think you could expand the detail related to the challenge?</td>
<td>It appears that you haven’t commented on anything you found challenging. If you did find something challenging, please expand on this.</td>
</tr>
<tr>
<td>&lt;icon&gt; Change new perspectives/new</td>
<td>Well done, it appears that you’ve reflected on how you would change/prepare for the future. Is there anything further to say about these new</td>
<td>It appears that you haven’t commented on what you would do differently should the same event occur in the future. Perhaps think about changes</td>
</tr>
</tbody>
</table>

https://www.heta.io/co-designing-automated-feedback-on-reflective-writing-with-the-teacher
Co-designing writing analytics with academics

Writing the automated feedback messages

Testing classification thresholds for sentence types

https://www.heta.io/co-designing-automated-feedback-on-reflective-writing-with-the-teacher
Participatory design with educators and students

Participatory design with educators and students

The LA-DECK of cards to give a voice to stakeholders

Server room
From project to ‘product’

Steps many LA prototypes never get to…

• secure user authentication (“single sign-on”) to provide a seamless and trusted user experience for students and staff

• auditing of the software to ensure compliance with preferred/required languages and architectural design

• security of code and APIs

• cloud hosting in approved infrastructures and location (student data stays in State/Australia)

• cloud scaling strategy to meet variable user demand;

• should a student report a problem there is an IT support workflow to handle the issue.
Classroom

(live f-f sessions and online asynch.)
Academic professional development and support

Learn how to enrich your feedback ecosystem

David Yeats | 09 April 2021 | 0 comments

‘Automated Feedback’ has existed in various forms at UTS for quite some time: from online quizzes, to adaptive learning platforms, to conditional messaging. But...

- But what really is it?
- Is it really automated?
- How does it extend upon my existing feedback practices?
- What can we use it for?
- Where is it the most effective?

In this event series, we will look at the key categories of automated feedback and how you can use them to respond to a range of common and pressing issues associated with learning and teaching.

The first session provides an introduction to the key types of auto feedback technology. The subsequent three sessions each look at how these can address some key issues around teaching and learning in digital environments.

Learn from experience

Alongside experts from UTS CIC, you will also get to hear from UTS academics about how they have been using some of these tools. We aim to grow a community of interest around this topic to help inform teaching and learning decision and LX.lab support strategies.

Briefings for teaching teams


1. Enriching your feedback ecosystem with automated feedback

Automated feedback can be used to create a more engaging, interactive and responsive learning environment. The focus is enriched through a wide range of different manners throughout the student experience. Providing feedback on an individual basis or in a group setting is just as important.

2. Building student belonging with automated feedback

Automated feedback can be used to create a more engaging, interactive and responsive learning environment. The focus is enriched through a wide range of different manners throughout the student experience. Providing feedback on an individual basis or in a group setting is just as important.

3. Responding to variable student pace of learning

How can UTS provide students with the support they need to succeed? This month’s blog explores the opportunities for personalization in teaching and learning.

4. Diagnosing your students’ needs with automated feedback

Using the opportunities to collect feedback can enhance our understanding of the student’s needs and improve the learning experience. The blog ‘Feedback’ explores how these opportunities can make a difference to the student experience.
“[rhetorical moves] indicate to the reader the writer’s attitude to the text. Why do we worry about that? Because as lawyers, our job is to […] argue that the way that we see the facts and the law favours a certain position or outcome.”

Philippa Ryan, Law academic

Academics explaining to their students why they need to care about their writing, and the relevance of AcaWriter

Civil Law essay writing

Philippa Ryan, Law academic

Accounting report writing

Nicole Sutton, Accounting academic

In class support

- Orientation portals and guides for students and staff
- Live or recorded video briefings
- Canvas modules to insert into course resources
- Cloud services ready (e.g. 400 simul. users in a class session)
- Learning design patterns for the effective use of the LA tool
Classroom

(impact analysis)
What we know about the impact of OnTask on students

- Fostered more optimal study habits \(^1,^5\)
- Enhanced academic performance \(^1,^6\)
- Elicited a ‘safe anxiety’ in some students \(^2\)
- Spurred student motivation \(^2,^3\)
- Fostered greater feelings of support \(^2,^4,^7\)
- Supported all phases of self-regulated learning \(^3\)
- Enhanced students’ course experience \(^4,^6\)

1. https://doi.org/10.1016/j.learninstruc.2019.04.003
3. https://doi.org/10.14742/ailet.6370
5. https://doi.org/10.1145/3303772.3303787
6. https://doi.org/10.1111/bjet.12592
"This tool helped me have quantitative data to reflect on. I can actively look back and see my exact actions, not just other perceptions of it"

Nursing educator reaction to automated feedback on student teamwork

“I think it would be really helpful for students … if you gave them really structured reflection questions … and asked them to reflect on what they were doing — whether it was accurate or not, how they’re engaging with the patient and other team members, what they were thinking and feeling at the time — it would be a really valuable tool for deep reflection.”

What does success look like?
Students feedback on AcaWriter

“I think what is being taught is something I was already aware of. However, by being forced to actually identify ways of arguing, along with the types of words used to do so, it has broadened my perspective. I think I will be more aware of the way I am writing now.”

"We can’t afford to give formative feedback when we have 400 students because it already takes us maybe about 20 hours to mark one class of these assignments — and so we can’t have the tutors spend that time again giving formative feedback. So, we had to do it in a way that is time-efficient."

What does success look like?

Educators’ feedback on AcaWriter

“Overall, since we’ve been working with CIC around written communication over the course of the last four of five semesters, we have seen marked improvement in students’ written communication. Overall their individual assignment pass-rate is going up... We are seeing improvements in the number of students who are either meeting or exceeding the expectations around written communication”

The joy of seeing academics reporting their use of our tools 😊

#UTSLTF22 UTS Law academic Chris Croese shares how he uses OnTask to send regular, personalised email feedback to each student, joint work with CIC's @LisaAngeLim

OnTask homepage: cic.uts.edu.au/tools/ontask

#UTSLTF22 @UTS_Science team used TRACK web apps to analyse skills overlaps/gaps between careers and UTS curriculum, to inform the new Science Employability Framework 👉 @willontheqo @scottchadwick87 & Charlotte Fleming

Videos and more about TRACK cic.uts.edu.au/tools/track-sk...
The joy of seeing academics reporting their use of our tools 😊
Ethics

As LA scales up, how do we build and sustain trust in the UTS community?

→ a structured, participatory, rewarding consultation process
The “EdTechEthics” Consultation

5 online Deliberative Democracy workshops, 3-4 hrs, with UTS students, tutors and academics

- Sept. 2021: Recruit a “Deliberative Mini-Public”
  - 20 students and staff
  - Commit to learning from ‘expert witnesses’ and to reflective deliberation

- Oct – Nov: Interactive workshops
  - Numerous hands-on activities to help engage with LA/AIED ethical dilemmas
  - Identify, discuss and prioritise principles and develop UTS examples

- Dec → 2022: Present principles to UTS leadership
  - Open dialogue with Data/Analytics Governance
  - 2022: inform and align with UTS AI Policy

The closing presentation from the EdTechEthics consultation

EdTechEthics principles & examples
How this could play out for UTS students, educators and the institution
“LA culture” comes from trust

Trust comes from respectful conversations in 4 different ‘rooms’…
Balancing and aligning the elements

Learning Analytics
User Experience
Learning Analytics + Learning Design
Learning Analytics Co-design
Organisational Strategy
The chapter behind this talk…


**Abstract:** In this chapter, I describe and reflect on the last 8 years at an Australian public university, inventing, piloting and evaluating Learning Analytics tools, specifically focused on data-driven personalised feedback, leading in some cases to integration with the institution’s learning technology ecosystem, and accompanied by staff training and support. I will summarise this as conversations in the *Boardroom*, the *Staff Room*, the *Server Room* and the *Classroom*, reflecting the different levels of influence, partnership and adaptation required to introduce and sustain novel technologies in the complex system that constitutes a university, or indeed, any educational institution. This chapter is pragmatic, documenting aspects of our work that are typically not the focus in research papers, intending to make a practice contribution.

**Keywords:** Organisational Strategy, Innovation Diffusion, Personalised Feedback